A new species of *Antheraea* Hübner, 1819 ("1816") from the mangrove swamps of the Mentawai Archipelago, Indonesia (Lepidoptera, Saturniidae)

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Abstract: A new species of the genus *Antheraea* Hübner, 1819 ("1816") in the subgenus *Antheraea* is described from Indonesia: *Antheraea (A.)* ***jakli*** **sp. n.,** male holotype from Siberut Island, will be deposited in the Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany; the species easily can by identified in the males by its relatively compact form of the wings, the broad outer margin of both fore- and hindwing, the creamy orange colour on the dorsal and the violet parts on the ventral side of the wings, as well as details in male genitalia. Females bear a bright yellow colour with pinkish violet markings on dorsal side and a violet note on ventral side. The new species is known from the Mentawai Islands west of Sumatra, Indonesia, and obviously is an endemic to the so-called Sumatran fore-arc of smaller islands off the western coast of Sumatra. Short notes on other mangrove-flying *Antheraea* species and related taxa from Sumatra province are given.

Key words: Sundaland, Sumatra, Siberut Island, synonymies.

Eine neue Art der Gattung *Antheraea* Hübner, 1819 („1816") aus den Mangrovensümpfen des Mentawai-Archipels, Indonesien (Lepidoptera, Saturniidae)

Zusammenfassung: Eine neue Art der Gattung *Antheraea* Hübner, 1819 („1816") aus dem Subgenus *Antheraea* wird aus Indonesien beschrieben: *Antheraea (A.)* ***jakli*** **sp. n.,** männlicher Holotypus von der Insel Siberut, wird in das Museum für Naturkunde der Humboldt-Universität zu Berlin gelangen; Merkmale der Männchen dieser Art sind die relativ kompakte, rundliche Flügelform, der sehr breite Postmedianbereich von Vorder- und Hinterflügel, die cremig-orange Grundfarbe auf der Flügeloberseite und die violette Färbung der Unterseite, sowie Details in den männlichen Genitalstrukturen; die Weibchen zeichnen sich durch eine intensiv gelbe Grundfarbe mit rosa-violetten Zeichnungselementen auf der Flügeloberseite sowie ebenfalls eine leichte Violettfärbung der Unterseite aus. Die hier beschriebene Art ist bisher von der Gruppe der Mentawai-Inseln westlich der indonesischen Insel Sumatra bekannt, und ist offensichtlich endemisch für den vorgelagerten Inselbogen von kleineren Inseln vor der Westküste Sumatras. Einige weitere aus Mangrovenwäldern bekannte *Antheraea*-Arten sowie verwandte Taxa von der Insel Sumatra werden kurz besprochen.

Introduction

During the last years the author achieved collecting results from smaller islands off the western coast of the island of Sumatra, mainly from Siberut, but also from Tanahmasa. Both islands are part of the Mentawai Archipelago which is separated zoogeographically from Sundaland at least since the mid-pleistocene more than 160 000 years ago and just 150 km southwest of the coastline of Sumatra to where they belong administratively today. They lie on the same arc as the Andaman and Nicobar Islands and the Arakan Yoma Range in Southwestern Myanmar (Malod & Kemal 1996: 21 *ff*., Samuel & Harbury 1996: 339). This isolation has led to a relatively high biodiversity, and the government of the Republic of Indonesia consistently recognized Siberut as a biosphere reserve in 1981; in 1993, the western portion of that island was designated as a National Park, covering an area of 1905 km² tropical lowland rainforests; almost the complete Eastern coastline of Siberut is covered with mangrove forests (Whitten et al. 2000: 21 *ff*.). Nevertheless, logging activities and oil palm plantations have already permanently removed 75 % of the forest cover of the complete Mentawai Archipelago, causing much soil erosion and loss of agricultural potential, and represent the most serious threat to that unique ecosystem. Siberut Island and the other small islands around have a wet equatorial climate; there is a raining season from around July to January.

Among the material received from several expeditions was a remarkable species of *Antheraea* Hübner, 1819 which at once was recognized to be undescribed. It is a typical faunal element of the coast-near lowland rainforests and mangrove forests, one specimen even was collected by locals at lights on a small fisherboat near the mangrove shoreline. A further, older specimen was located in the collection of the late Dr. S. Kager, now in ZSM; there is also one female specimen in SMFL which is already a paratype of another taxon described earlier after a mixed type series (see in the discussion).

Abbreviations used

AT Paratype: allotype.

BMNH The Natural History Museum, London, Great Britain (formerly British Museum (Natural History)).

CSNB Collection Stefan Naumann, Berlin, Germany.

GP Genitalia preparation (with number and collection abbreviation).

HT Holotype.

PT Paratype(s).

RMNH Nationaal Natuurhistorisch Museum Naturalis, Leiden, Netherlands (formerly Rijksmuseum van Natuurlijke Historie).

SMFL Senckenberg-Museum, Lepidoptera collection, Frankfurt am Main, Germany.

ZMA Zoölogisch Museum Amsterdam, Netherlands.

ZSM Zoologische Staatssammlung, München, Germany.

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Systematic part

Antheraea (Antheraea) jakli n. sp.

Holotype ♂: (Figs 1, 2): Indonesia, Sumatera Barat Prov., Kepulauan Mentawai, Siberut Island (North), Bojakan, 100 m, XI. 2004, leg. S. JAKL, received VIII. 2005 from Jean-Marie CADIOU, GP 1305/05 NAUMANN (CSNB). A red holotype label will be fixed accordingly.

Paratypes (in total 4 ♂♂, 4 ♀♀), all Indonesia, province Sumatera Barat, Mentawai Archipelago (= Kepulauan Mentawai), Siberut Island: 1 ♀ (allotype, Figs. 7, 8), Salappa village env., 0–10 m, mangrove forest, II. 2007, leg. S. JAKL, bought IX. 2007 (CSNB) (a red allotype label will be fixed accordingly). 1 ♂ (Fig. 3), same data as holotype, barcode SNB 0136 (CSNB). 1 ♂, North, Mt. Malancan, 200 m, I. 2004, leg. S. JAKL, received III. 2005 from J.-M. CADIOU, GP 1762/08 NAUMANN (CSNB). 1 ♀, southern, Muara, 0 m, mangrove shore, XI. 2005, leg. S. JAKL, bought VI. 2006 (CSNB). 1 ♂, southern, Muara Siberut env., 0–10 m, mangrove forest, 30. VII. 2007, leg. local collector, bought IX. 2007 from S. JAKL (CSNB). 1 ♀, southern, Salappa village env., 50 m, XI.2005, leg. S. JAKL, bought VI. 2006, barcode SNB 0137 (CSNB). 1 ♂, 18. XII. 1971, coll. S. KAGER, GP 1597/07 NAUMANN (ZSM); 1 ♀, Mentawai Isl., 23. XII. 1992, WIDAGDO/Dr. DIEHL leg., coll. L W. R. KOBES > coll. W. A. NÄSSIG; Paratypus *Antheraea (Antheraea) mentawai* NÄSSIG, LAMPE, & KAGER, 2002 [blue PT label]; specimen illustrated in Heterocera Sumatrana **10** [green label] (SMFL). Blue paratype labels will be fixed accordingly.

Holotype and allotype will be deposited in the collections of the Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany, the other paratypes remain in their original collections.

Derivatio nominis: The new species is dedicated to Stanislav JAKL who obtained that hardly achievable and interesting material durnig several expeditions from Indonesia.

Description

♂ (Figs. 1–3): Antenna ochreous brown, 10.5–11.0 mm long, longest rami 3.4–3.6 mm, quadripectinate, apical 1.8 mm with very short or reduced rami and only bipectinate. Length of right forewing from basis to forewing apex 56.5–57.0 mm (average 56.7 mm, n = 5; HT 56.5 mm). Ground colour on dorsal side a dull orange brown, in one specimen more reddish orange. Collum and proximal half of costa suffused greyish, apical part in orange wing colour. Thorax, abdomen and forewing antemedian field light orange, median field in ground colour, proximal to the forewing ocellus somewhat lighter, with a curved median line distal to the ocellus. Ocellus round or little oval black bordered, then basal violet, distal with yellow line, the center dark olive and brown with small or missing hyaline center; 4.5–6.0 mm maximum diameter (average 5.5 mm, n = 5), hyaline center absent up to 1.8 mm in maximum diameter (average 1.0 mm, n = 5). Anterior to the postmedian line a shadow of an orange wavy line, the purple postmedian line itself nearly straight, just to lower wing margin a little indented to proximal side at the veins and bent outward in a typical manner. Postmedian area coloured uniformously dark orange brown, the forewing apex relatively round, obtuse, the lower outer wing margin is bent outward and thereby the forewing gets a compact form. Hindwing in the same colour and ornamentation, but any borders of an antemedian field missing. Hindwing ocellus in same colours as in forewing, 4.5–5.2 mm in maximum diameter (average 4.9 mm, n = 5), hyaline center absent to 1.0 mm in maximum diameter (average 0.6 mm, n = 5). On ventral side all specimens of more homogeneous, orange and dark purplish grey colouration. On both fore- and hindwings antemedian band missing, ocelli without outer black ring, from that part on the outer wing parts darkened, with a black patch on fore- and hindwing apex. Along the outer margin a dull reddish brown shadow.

♂ genitalia (Fig. 11): As already mentioned in many descriptions of *Antheraea* species, the differences of ♂ genitalia within the so-called *frithi*-group are only very minor between the different species. So, due to similar "architecture", only minor differences between different species in size and form of certain structures can be found. The ♂ genitalia of *A. (A.) jakli* (genitalia nos. 1305/05, 1597/07, 1762/08 SNB) were compared with those of *A. (A.) brunei* ALLEN & HOLLOWAY, 1986 (GP 1304/05 SNB; Fig. 12), *A. (A.) gulata* NÄSSIG & TREADAWAY, 1998 (GP 1595/07 SNB; Fig. 13), and *A. (A.) moultoni* WATSON, 1927 (GP 495/00 SNB), plus those of other related taxa which were figured in literature so far, e.g. with *A. (A.) mentawai* NÄSSIG, LAMPE & KAGER, 2002, figured in the original description. In comparision to the other mentioned species the uncus of *A. (A.) jakli* is strongly sclerotized and short-based, the dorsal process of the valves longer, without the dorsal round projection, and has two long and lots of shorter bristles, both central and ventral process are tallest in *A. (A.) jakli* compared to those mentioned above. The juxta is splitted into two tall processes while in the other species this part is much shorter. The phallus is somewhat broader and has a strongly sclerotized tip with few thorns along the vesica. The 8th tergite which sometimes shows typical forms in *Antheraea* (compare NÄSSIG 1991: 6) is somewhat taller than in *A. (A.) gulata* which overall appears most similar in ♂ genitalia.

♀ (Figs. 7, 8): The sexual dimorphism in *A. (A.) jakli* is as typical in *Antheraea;* the ♀ is much larger, has less falcate wings and larger wing ocelli, and is of quite homogeneous yellow colour on dorsal side but anyway shows the typical indention of the forewing postmedian band near to the lower margin which was also described for the ♂. Antenna ochreous brown, ca. 11 mm long. Length of right forewing from basis to forewing apex 59–70 mm (average 65 mm, n = 4). Wings have as only pattern elements a purplish or greyish shadow of a dentate median line, and a typical straight, pinkish violet postmedian line which is crenulate in the lower part and, as in the ♂, shows a typical turn outward near to the lower margin of the wing. Colouration of the ocelli in same manner as in ♂♂, but larger, in the forewing 8.0–9.1 mm in maximum diameter, and always with hyaline centers of 4.2–5.0 mm maximum diameter, in the hindwing 6.5–7.0 mm maximum diameter with 1.5 mm wide hyaline patch. The ventral side ochreous colour, suffused more or

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less with violet and greyish scales. Ocelli bordered black, then followed by a bluish and inner carmine ring. Pattern elements are the vague antemedian line, an almost straight reddish brown median line and, again, a vague dentated violet postmedian line, and the black patches of both fore- and hindwing apex as in the ♂♂. The entire ventral side is of somewhat violet appearance.

Discussion

A. (A.) jakli is a member of the so-called *mylitta/frithi*-group in the subgenus *Antheraea* (classification following Nässig 1991, with modifications as mentioned, e.g., in Paukstadt et al. 2000). There are some further members in the same group of the subgenus which are partially known to live in mangrove forests or are at least supposed to do so (listed in chronological order of their description):

***A. (A.) andamana* Moore, 1877:** The life cycle of that taxon from the Andaman Islands was described in detail by Prashanth Mohanraj & Veenakumari (2002). Larvae were recorded on different *Ficus* species, both in mangroves and back mangals, and up to 365 m elevation on Mt. Harriet, South Andaman. *A. andamana* is the only mangrove species for which a complete life history was recorded so far.

***A. (A.) billitonensis* Moore *in* Druce, 1878** (Fig. 6, ♂ HT): The HT from Belitung Island east of Sumatra is deposited in BMNH; it is figured here in colour. A single yellow ♀ from the same island which was figured already in Nässig et al. (1996: pl 15, fig. 77) is in RMNH and could be the fitting ♀ of *billitonensis*. Results of DNA studies within that group are to be awaited for further taxonomic work. Nässig et al. (1996: 55) supposed it to occur either in the extreme lowland or mangrove areas.

***A. (A.) insularis* Watson, 1914** (Fig. 9 ♀): This taxon is known from the Andaman Islands; it was described as subspecies and later raised to species rank (Brechlin & Kitching 2001: 120), due to zoogeographical reasons. From published locality data it can be imagined that at least some specimens were also found in mangroves; notes on preimaginal instars are not known although Prashanth Mohanraj and K. Veenakumari undertook many efforts to contribute further knowledge to the saturniid fauna of the Andaman Islands.

A. (A.) moultoni: The species which looks very similar to *A. (A.) billitonensis* was mainly collected in or close to mangroves, sometimes in lowland forest near to the seaside of northern Borneo (Holloway 1987: 104). In Brunei it was recorded syntopically with the following species. A possible synonymy with *A. billitonensis* must be cleared with DNA studies of more actually collected material from Belitung Island; already Nässig et al. (1996: 55) and Holloway & Hall (1998: 19) mentioned a supposed close relationship of both taxa.

A. (A.) brunei (Fig. 4 ♂, Fig. 10 ♀, Fig. 12 ♂ genitalia): This is one of the very typical mangrove species with mostly overall yellow ground colour; Naumann (1994) mentioned a reddish brown form which lateron appeared to occur sometimes in that species from Brunei (additional specimens in SMFL), and gave notes on the first instar larvae. A single ♂ in RMNH is recorded from Billiton Island; it was figured by Nässig et al. (1996: pl. 15, fig. 76), reliable records or recently collected specimens from e.g. Sumatra are missing so far, although supposed to occur there by Nässig et al. (1996: 56; pl. 15, fig. 78 ♀) after a single record of uncertain identity in ZMA.

A. (A.) gulata (Fig. 5 ♂, Fig. 13 ♂ genitalia): The second typical mangrove species with creamy yellow colour, occuring on Palawan Island, was mentioned by Allen & Holloway (1986: 131), Holloway (1987: 105) and others as *A. (A.) brunei* but later described as a separate species due to differences in general appearance and ♂ genitalia. In December 2007 a small series was collected inside the mangrove swamps of SE and Central Palawan by J. Lourens, and for the first time also here few darkened, somewhat orange specimens appeared (specimens in CSNB). There obviously is some parallelism in the colouration of *A. (A.) gulata* with *A. (A.) brunei*. Although mentioned in the original description of *A. (A.) gulata* that the species was not only collected in mangroves but also in altitudes up to 800 m, the new series was exclusively found inside mangrove forest along the coastline.

A. (A.) mentawai: This species was described from different islands, all belonging to the Mentawai Archipelago: While the ♂ HT plus one further pair of PT comes from Pulau Pagai Utara, a smaller island about 150 km south of Siberut, there is one additional ♀ yellow PT mentioned to come from Mentawai Island without exact origin. The taxon *A. (A.) mentawai* was placed into synonymy with *A. (A.) broschi* Naumann, 2001 by Paukstadt & Paukstadt (2004: 157), due to overall similarity of the ♂ HT of *A. (A.) mentawai* with the latter. The justification of that act has to be proven by DNA studies; there is a good probability due to zoogeographical reasons (see introduction) that *A. (A.) mentawai* can be separated on species level; no taxonomic acts are undertaken here, because no recent studies were made. When describing *A. (A.) broschi* somewhat earlier, the author did not intend to create a senior synonym as the plan to describe the Mentawai material in SMFL was already known to him; during all his studies he always assumed that the description of a Mentawai taxon would be based on the ♀♀, and not on the ♂ later choosen as HT. Obviously the type series of *A. (A.) mentawai* consists of two different species, the greyish ♀ (figured in Nässig et al. 1996: pl. 15, fig. 82.a still with unclear identity) probably being conspecific with the ♂ HT, but the yellow ♀ PT (figured in Nässig et al. 1996: pl. 15, fig. 82.b) being clearly a specimen of the here described *A. (A.) jakli,* which is also listed here in the PT series of *A. jakli*. It shows all typical elements of the other PT ♀♀ of that species: the yellow colour, the little bent lower postmedian line of the forewing and the pinkish underside of both wings with straight markings.

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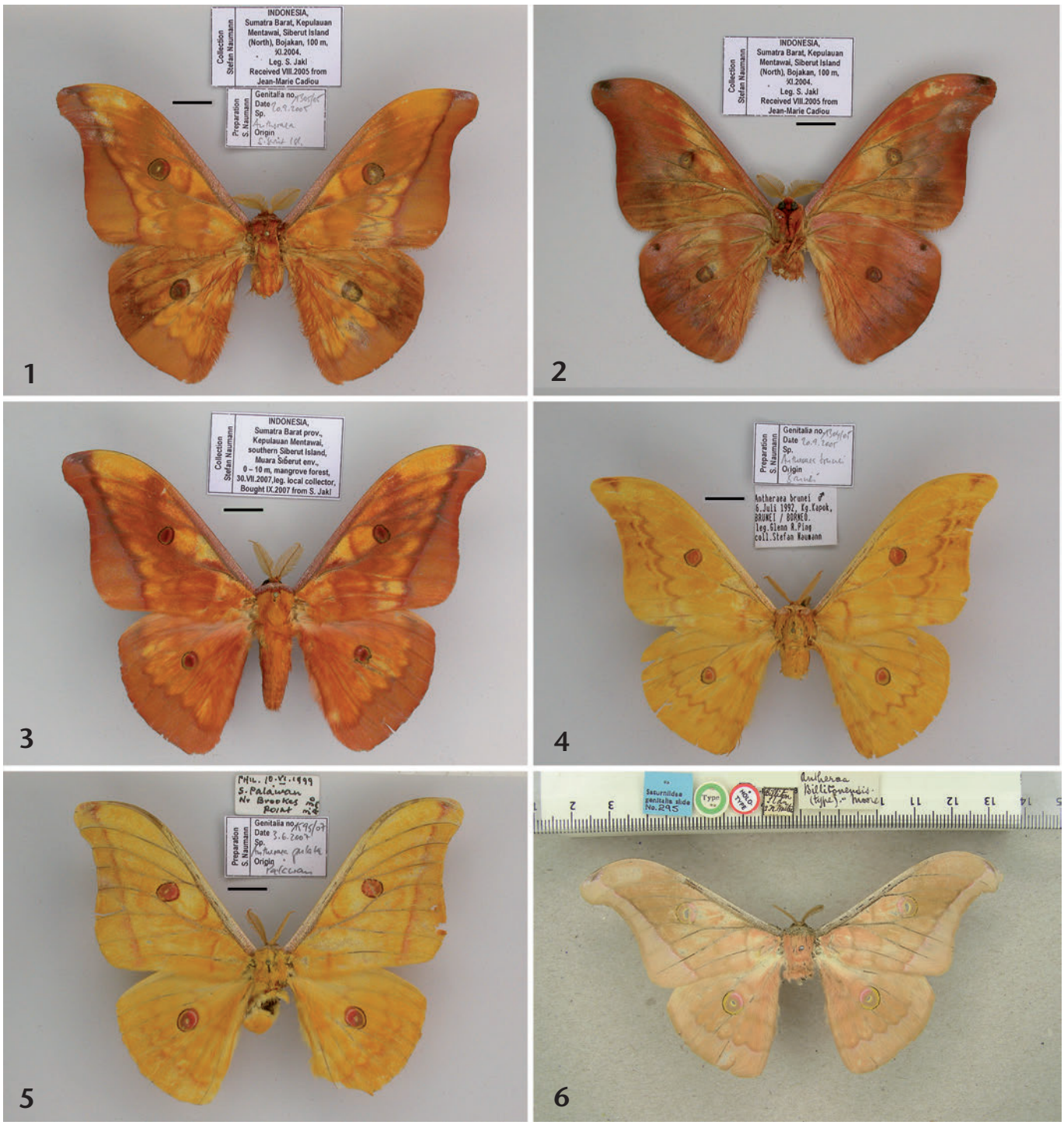

Colour plate 1, Figs. 1–6: ♂ *Antheraea* specimens. **Fig. 1:** *Antheraea (Antheraea) jakli* n. sp., HT, dorsal view. **Fig. 2:** HT, ventral view. **Fig. 3:** *A. (A.) jakli,* PT, reddish morph, dorsal view. **Fig. 4:** *A. (A.) brunei,* Brunei, dorsal view. **Fig. 5:** *A. (A.) gulata,* Palawan, dorsal view. **Fig. 6:** *A. (A.) billitonensis,* HT, dorsal view. — Specimens figured in Figs. 1–5 in CSNB, Fig. 6 in BMNH (by kind permssion). — Figs. 1–5 to the same scale. Scalebar 1 cm.

Aside of *A. (A.) jakli* which administratively belongs to the Sumatran fauna, the following members of the *mylitta/frithi*-group are recorded so far from that large Sundanian island (listed in chronological order of their description): *A. (A.) larissa* (Westwood, 1847), *A. (A.) platessa* Rothschild, 1903, *A. (A.) gschwandneri* Niepelt, 1918, *A. (A.) sumatrana* Niepelt, 1926, *A. (A.) steinkeorum* Paukstadt, Brosch, & Paukstadt, 1999, and *A. (A.) broschi* Naumann, 2001 (compare Nässig et al. 1996, Paukstadt et al. 1998). Paukstadt et al. (1998: 321) noted that *A. (A.) brunei* is known in few specimens from Sumatra; so far the only known specimen which was referred to in literature is a ♀ with data "A. L. van Hasselt, Tapanoelie [= Tapanuli], Sum. 1895" in coll. van Groenendael, ZMA, with uncertain identity; it was figured by Nässig et al. (1996: pl. 15, fig. 78). Further specimens are not yet known to the author. Nevertheless, it is quite probable that further mangrove species similar to *A. (A.) brunei, A. (A.) gulata* or *A. (A.) jakli* may be found in mangrove forests, not only in Sumatra but also in other areas of SE Asia. They all belong to a group of critically endangered species which are threatened by

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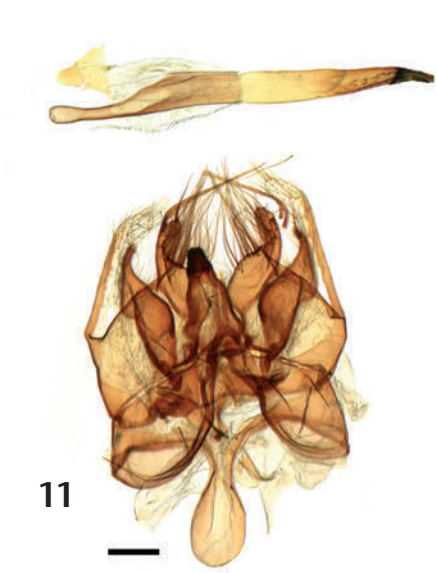

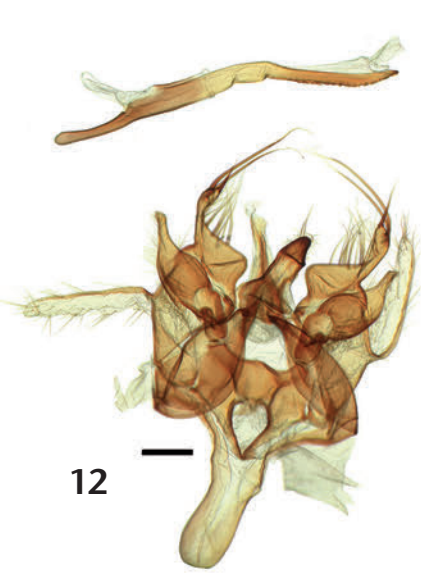

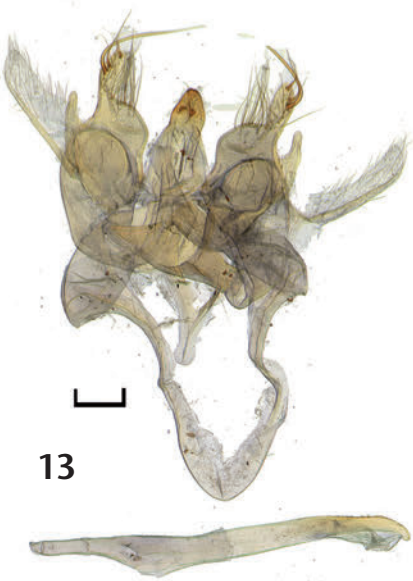

Colour plate 2, Figs. 7–10: ♀ *Antheraea* specimens. **Fig. 7:** *A. (A.) jakli* n. sp., PT (AT), dorsal view; **Fig. 8:** AT, ventral view. **Fig. 9:** *A. (A.) insularis,* Andaman Islands, dorsal view. **Fig. 10:** *A. (A.) brunei,* Brunei, dorsal view. — Specimens figured in Figs. 7–10 in CSNB. — Figs. 1–5 to the same scale. Scalebar 1 cm. — **Figs. 11–13:** ♂ genitalia structures. **Fig. 11:** *A. jakli* n. sp., HT, GP 1305/05 SNB. **Fig. 12:** *A. (A.) brunei,* GP 1304/05 SNB. **Fig. 13:** *A. (A.) gulata,* GP 1595/07 SNB, with 8th tergite. — Figs. 11–13 approximately to the same scale; scalebar 1.0 mm.

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intensive mangrove deforestation as those biotopes are used widely for brackish water crab agriculture in the entire SE Asian area and will disappear more and more.

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